Assessment of the Effect of Immobilized Phanerochaete Chrsosporium on Polyurethane Foam in Reduction of Some Contamination Indices of Bagasse Storage Wastewater

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Background & Objectivess: In Bioremediation presses to improve the useful life of ligninolytic enzymes of P. chrysosporium, immobilization strategy was found promising. In the present work, PUF sponge was preferred, mainly due to its inert nature as support. The main objective of present work is therefore, to develop and evaluate an alternative treatment process based on biodegradation ability of immobilized P. chrysosporium on PUF for bagasse wastewater.

Methods: Activities of the ligninolytic enzymes and the COD, BOD and color were measured.

Results: After 9 days, removal efficiency of colour by free and immobilized fungal cell operation reached to 80.2 and 84.6% and after 7 days, the concentrations of BOD were 113 ± 3 and 46 ± 9.5 mg l-1leading to removal efficiencies 96 and 98.3% and the concentrations of COD were 120 ± 24 and 76 ± 11.8 mg l-1 leading to removal efficiencies 97.2 and 98.2% respectively. Activity of peroxidase enzyme was first detected in both free and immobilized treatment from day 2 of the incubation. Then it increased peaking on the 5th day (260 ± 7.55 Ul-1 of the immobilized culture, compared with 195 ± 3.12 of the free culture) and was maintained around 250 ± 4.58 Ul-1 until the 7th day of immobilized culture but decreased sharply to 141 ± 2.65 Ul-1 of free culture. Like peroxidase, Laccase first appeared on day 2 (12 ± 2.65 and 14 ± 3.46 U l-1 in free and immobilized culture respectively) and attained a maximum level on day 5 too (78 ± 3 and 131 ± 5.29 U l-1 in free and immobilized culture respectively). Xylanase production was increased to 74 ± 3.6 ul-1 immobilized treatment and 59 ± 5.1 ul-1 in free cell treatment in day 3, after this, declined slowly in immobilized treatment and sharply in submerged one.

Conclusion: By immobilization of fungus cells on poly urethane foam, it is possible to reduce the biodegradation time and also increase both activity and longevity of the lignolitic enzymes

Keywords: Immobilized; Phanerochaete Chrsosporium; Polyurethane Foam; Bagasse; Wastewater